U. S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Drosophila attigua*

COMMON NAME: No common name

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: September 2005

STATUS/ACTION:

____ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

____ New candidate

__X_ Continuing candidate

____ Non-petitioned

__X_ Petitioned - Date petition received: May 11, 2004

____ 90-day positive - FR date:

_X__ 12-month warranted but precluded - FR date: May 11, 2005

_N__ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov).

____ Listing priority change

Former LP: ____

New LP: ____

Date when the species first became a Candidate (as currently defined): 1996

____ Candidate removal: Former LP: ____

___ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Insects; Family Drosophilidae (pomace fly)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

LAND OWNERSHIP:
Drosophila attigua is known from two populations on State and private lands located on the island of Kauai (Hawaii Biodiversity and Mapping Program database 2004; Kaneshiro and Kaneshiro 1995).

LEAD REGION CONTACT: Paul Phifer (503) 872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish & Wildlife Office, Lorena Wada, (808) 792-9400, lorena_wada@fws.gov

BIOLOGICAL INFORMATION:
Species Description: *Drosophila attigua* is a large *Drososphila* species with adult males ranging in size from 4.6 to 5.0 millimeters (mm) (0.18 to 0.19 inches (in)) in length and adult females from 4.9 to 6.1 mm (0.19 to 0.23 in) in length. Adults are essentially brownish yellow in color and have yellow colored legs and hyaline wings (shiny-clear). *Drosophila attigua* is unique among Hawaiian *Drosophila* and comprises its own species group called anomalipes (Kaneshiro 1976).

Taxonomy: *Drosophila attigua* was described by Hardy and Kaneshiro (1969), and the species is recognized as a distinct taxon. Hardy's and Kaneshiro's 1969 taxonomic write up is the most recent and accepted taxonomy for this species.

Habitat: *Drosophila attigua* is endemic to the island of Kauai, where it apparently breeds in the stems and branches of *Cheirodendron* trees. The elevational range of this species is approximately 750 to 1,200 meters (m) (2,460 to 3,936 feet (ft)), and the species is also restricted

to areas receiving in excess of 400 centimeters (cm) (157 in) of rain annually (Speith 1980).

Historic and Current Range/Distribution: *Drosophila attigua* is known from two populations, Pihea on the western end of the Alakai Swamp, and Mt. Kahili east of the Alakai massif (Kaneshiro and Kaneshiro 1995; Hawaii Biodiversity and Mapping Program database 2004). -

Background Information: This species belongs to perhaps the most remarkable group of Hawaiian insects, and that which most typifies insect evolution in Hawaii, the fly family, Drosophilidae (Williamson 1981). To date, 511 species of Hawaiian Drosophilidae have been named and described. An additional 250-300 species are already in the collection at the University of Hawaii and await taxonomic treatment, and new species are still being discovered from localities not previously sampled. It is estimated that as many as 1,000 species may be present in native Hawaiian ecosystems (Kaneshiro 1993). The drosophilid family in Hawaii represents one of the most remarkable cases of adaptive radiation of any group of animals over the entire world (Hardy and Kaneshiro 1981). These flies are distributed throughout the high islands of the archipelago, displaying not only a highly characteristic single island endemism, but also extraordinary morphological diversity along with adaptations which show their intimate ecological relationship to the native flora (Carson and Yoon 1982).

This species is similar in structure to other Drosophilidae and other flies in that adults have three main body parts--a head, thorax, and abdomen. One pair of antennae arises from the front of the head, between the eyes. The single pair of wings and three pairs of legs are attached to the thorax. The abdomen is composed of multiple segments.

The general life cycle of Hawaiian Drosophilidae is typical of that of most flies: after mating, females lay eggs from which larvae (immature stage) hatch; as larvae grow they molt (shed their skin) through three successive stages (instars); when fully grown the larvae change into pupae (a resting form) in which they metamorphose and emerge as adults (Borror *et al*. 1989).

The Hawaiian Drosophilidae have also radiated and adapted ecologically to a tremendous diversity of ecosystems ranging from desert-like habitats where the soil is powdery dry, to rain forests with lush, tree-fern jungles, and in swampland perpetually shadowed by rain clouds and vegetation that is burdened with dripping, moss-laden branches (Kaneshiro and Kaneshiro 1995). While the larval stages of most species are saprophytic, feeding on decaying vegetation such as rotting leaves, bark, flowers, and fruits, some have become highly specialized, being carnivorous on egg masses of spiders, or feeding on green algae growing underwater on boulders in streams. As a group, the Hawaiian Drosophilidae appears to be ubiquitous and can be found in most of the natural communities in Hawaii (Kaneshiro and Kaneshiro 1995).

Unlike most Hawaiian insects which remain obscure, typically known only from their original taxonomic descriptions, every aspect of Hawaiian Drosophilidae biology has been researched, including their internal and external morphology, behavior, ecology, physiology, biochemistry, the banding sequence of giant chromosomes, as well as detailed analyses of the structure of the DNA molecules (Foote and Carson 1995; Kaneshiro and Kaneshiro 1995). More than 80 research scientists and over 350 undergraduates, graduate students, and post-doctoral fellows

have participated in research on the Hawaiian Drosophilidae, resulting in over 600 scientific publications on the biology of these flies. The Hawaiian Drosophilidae is arguably the most intensively studied group of all terrestrial Hawaiian organisms (Foote and Carson 1995; Kaneshiro and Kaneshiro 1995).

Research on Hawaiian Drosophilidae has resulted in the development and testing of new theories of evolutionary biology (Carson 1971, 1982a; Kaneshiro 1976, 1980, 1987, 1989; Bradley *et al*. 1991). Ideas on speciation and island evolution developed from studies on Hawaiian Drosophilidae are now referenced in most modern text books of biology and evolution (*e.g*., Ridley 1993).

The Hawaiian Drosophila Project at the University of Hawaii has coordinated and cooperated in most of the research on the Hawaiian Drosophilidae. It has also maintained extensive collection records of these species. These records form the basis for much of the data used to develop this candidate form. Three decades of collection work are maintained in permanent files of the Hawaiian Drosophila Project within the University of Hawaii's Center for Conservation Research and Training. Also, collection notes of the individual researchers on the project contain extensive records of host plant associations of most of these species.

THREATS:

A. <u>The present or threatened destruction, modification, or curtailment of its habitat or range</u>. Native vegetation on all the main Hawaiian islands has undergone extreme alteration because of past and present land management practices including ranching, deliberate and unintentional introduction of nonnative plants and animals, and agricultural development (Cuddihy and Stone 1990). One of the primary threats facing this species is destruction of habitat by feral animals and invasion by nonnative plants.

Animals such as pigs, goats, and cattle were introduced either by the early Hawaiians (pigs) or more recently by European settlers (all other ungulate species) for food, commercial ranching activities, and/or recreational hunting (Cuddihy and Stone 1990). Over the 200 years following their introduction, their numbers increased and the adverse impacts of feral ungulates on native vegetation have become increasingly apparent. Beyond the direct effect of trampling and grazing native plants, feral ungulates have contributed significantly to the heavy erosion still taking place on most of the main Hawaiian Islands (Cuddihy and Stone 1990). –

While foraging, pigs root and trample the forest floor, encouraging the establishment of nonnative plants in the newly disturbed soil. Pigs also disseminate nonnative plant seeds through their feces and on their bodies, accelerating the spread of nonnative plants through native forest (Stone 1985; Cuddihy and Stone 1990). Foote and Carson (1995) experimentally demonstrated the detrimental affects of feral pigs on Hawaiian picture-wings in wet forest habitat on the island of Hawaii.

Feral goats now occupy a wide variety of habitats from lowland dry forests to montane grasslands on Kauai, Oahu, Molokai, Maui, and Hawaii, where they consume native

vegetation, trample roots and seedlings, accelerate erosion, and promote the invasion of nonnative plants (van Riper and van Riper 1982; Stone 1985). Goats occur in the areas where *Drosophila attigua* occur on Mt. Kahili and are likely to be degrading habitat in the manner described above.

Most of the plants which serve as breeding sites for Hawaiian *Drosophila* species occur as understory vegetation beneath the canopy of the *Metrosideros polymorpha* (ohia tree) and *Acacia koa (*koa tree), and are affected by competition with nonnative weeds. This *Drosophila* species is threatened by loss of host plants due to competition primarily from these nonnative plant species: *Schinus terebinthifolius* (Christmasberry), *Psidium cattleianum* (strawberry guava), *Melinus minutiflora* (molasses grass), *Clidemia hirta* (Koster's curse), *Lantana camara* (lantana), *Rubus argutus* (prickly Florida blackberry), *Passiflora tarminiana* (banana poka), and *Rubus ellipticus* (Himalayan raspberry) (Smith 1985; Kaneshiro and Kaneshiro 1995).

Strawberry guava is an invasive shrub or small tree native to tropical America and like Christmasberry, strawberry guava is capable of forming dense stands that exclude other plant species (Cuddihy and Stone 1990). This nonnative plant grows primarily in mesic and wet habitats between 150 to 1300 meters and provides food for several nonnative animal species, including feral pigs and game birds, which disperse the plant's seeds through the forest (Smith 1985; Wagner *et al*. 1999; Hawaii Ecosystems at Risk database 2005). Strawberry guava is considered one of the greatest nonnative plant threats to Hawaii's rain forests and is known to pose a direct threat to *Drosophila attigua* on the island of Kauai. Strawberry guava is a major invader of forests in the Mt. Kahili area where it often forms single-species stands.

Koster's curse, a noxious shrub native to tropical America, also occurs on Kauai. It poses a serious threat to *Drosophila attigua* by displacing native plants used by this species as breeding sites (Smith 1985; Kaneshiro and Kaneshiro 1995; Hawaii Ecosystems at Risk database 2005).

Prickly Florida blackberry was introduced to the Hawaiian Islands in the late 1800s. The fruit is easily spread by birds to open areas where this plant can form dense, impenetrable thickets (Smith 1985). It is found in mesic to wet forests and subalpine grasslands, ranging from 200-2,300 meters (Hawaii Ecosystems at Risk database 2005). On Kauai, the habitat of *Drosophila attigua* is threatened by this noxious weed.

A vine in the passionflower family, banana poka was introduced to the islands in the 1920s, probably as an ornamental. This vine is extremely detrimental to certain wet forest habitats of Kauai, Maui, and Hawaii. Heavy growth of this vine can cause damage or death to the native trees by overloading branches, causing breakage, or by forming a dense canopy cover, intercepting sunlight and shading out native plants below. This weed threatens *Drosophila attigua* on Kauai (Smith 1985; Kaneshiro and Kaneshiro 1995).

No efforts are being conducted in the Mt. Kahili area to reduce the threat of either ungulates or nonnative plants. In the Pihea area, the Kokee Resource Conservation Program is working

to eradicate ginger. There are no other efforts being conducted to reduce the threat of ungulates or other nonnative plants.

B. Over-utilization for commercial, recreational, scientific, or educational purposes.
We are unaware of any current threats to this species resulting from over-utilization.

C. Disease or predation.
The geographic isolation of the Hawaiian Islands historically restricted the number of original successful colonizing arthropods and resulted in the evolution of a unique fauna. An unusually small number (15 percent) of the known families of insects are represented by native Hawaiian species (Howarth 1990). Entirely absent are some groups that often dominate continental arthropod faunal groups such as social Hymenoptera (group nesting ants, bees, and wasps). Commercial shipping and air cargo to Hawaii has now resulted in the establishment of over 3,372 species of nonnative insects (Howarth 1990; Howarth *et al*. 1995; Staples and Cowie 2001), with an estimated continuing establishment rate of 20 to 30 new species per year (Beardsley 1962, 1979; Staples and Cowie 2001).

In addition to the accidental establishment of non-native species, non-native predators and parasites for biological control of pests have been purposefully imported and released by individuals, Republic, Territorial, State, and Federal agencies, in Hawaii since 1865. Between 1890 and 2004, 387 non-native species were introduced, sometimes with the specific intent of reducing populations of native Hawaiian insects (Funasaki *et al*. 1988; Lai 1988; Staples and Cowie 2001). Non-native arthropods, whether purposefully introduced or adventive, pose a serious threat to Hawaii's native *Drosophila*, through direct predation or parasitism, and competition for food or space (Howarth and Medeiros 1989; Howarth and Ramsay 1991; Kaneshiro and Kaneshiro 1995; Staples and Cowie 2001).

Due to their large colony sizes and systematic foraging habits, species of social Hymenoptera (ants and some wasps) and parasitic wasps pose the greatest predation threat to Hawaiian *Drosophila* flies (Carson 1982b; Gambino *et al*. 1987; Kaneshiro and Kaneshiro 1995). Ants and other social insects frequently dominate the ecologies of tropical ecosystems and strongly influence the evolution of certain plants and animals. All of the native Hawaiian arthropods, including the Hawaiian *Drosophila*, evolved without the predation influence of ants or social wasps, and the arrival of these new groups has been especially devastating to the relatively defenseless native Hawaiian invertebrate flora (Kaneshiro and Kaneshiro 1995).

Ants, family Formicidae within the order Hymenoptera, are not a natural component of Hawaii's arthropod fauna, and native species evolved in the absence of predation pressure from ants. Ants can be particularly destructive predators because of their high densities, recruitment behavior, aggressiveness, and broad range of diet (Reimer 1993). These attributes allow some ants to affect prey populations independent of prey density; thus ants can locate and destroy isolated populations and individuals (Nafus 1993a, 1993b). At least 44 species of ants are known to be established in the Hawaiian Islands (Hawaii Ecosystems At Risk database, 2005), and at least four particularly aggressive species have severely

affected the native insect fauna (Zimmerman 1948; Hawaii Ecosystems At Risk database, 2005). To complicate matters, most ant species have winged reproductive adults (Borror *et al*. 1989) and once established anywhere in the State, they are likely to colonize suitable habitats on all islands in time (D. Foote, pers. comm. 2005).

At least one species of fire ant, *Solenopsis papuana*, is a significant threat to *D. attigua* (Reagan 1986; Gillespie and Reimer 1993) and occurs on the island of Kauai (Reimer *et al.* 1990; Start 2004). *Solenopsis papuana* is the only abundant, aggressive ant that has invaded intact mesic forest above 600 meters (2,000 feet), and it is still expanding its range in Hawaii (Reimer 1993).

Numerous other ant species are recognized as threats to native invertebrates, and additional species become established almost yearly. While the larvae of most of the Hawaiian *Drosophila* flies feed deep in the substrate of the host plant, they emerge and move away to pupate in the ground, thus exposing themselves to predation by ants. Upon newly emerging as adults, Hawaiian *Drosophila* flies are particularly susceptible to predation, and some adult flies have been observed with ants attached to their legs (Kaneshiro and Kaneshiro 1995).

Drosophila attigua may potentially suffer less predation from some ant species currently present in the islands due to the susceptibility of many ant species to fungal pathogens. However, the likelihood of ant species better adapted to wetter climates becoming established in the Hawaiian Islands is an issue that may need attention in the future (D. Foote, pers. comm. 2005). Conserving *D. attigua* populations in multiple locations should decrease the likelihood that the effect of any single non-native parasite or predator or combined pressure of such species could result in the diminished vigor or extinction of this species.

Another group of social insects that are voracious predators and were originally absent from Hawaii are yellowjacket wasps (order Hymenoptera, family Vespidae). In 1977, an aggressive race of the western yellowjacket wasp (*Paravespula pennsylvanica*) became established in the State and is now abundant at most higher elevations (Gambino *et al*. 1990). In Haleakala National Park on Maui, yellowjackets were found to forage predominantly on native arthropods (Gambino *et al*. 1987, 1990; Gambino and Loope 1992). Overwintering yellowjacket colonies in Hawaii can produce over half a million foragers that consume tens of millions of arthropods, and evidence exists for localized reduction in native arthropod abundance (Gambino and Loope 1992). Yellowjacket wasps have been observed preying on Hawaiian picture wing flies (Kaneshiro and Kaneshiro 1995), and the establishment of this species on the island of Hawaii corresponded with a significant decline in several species of Hawaiian picture wing flies (Carson 1982b, 1986; Foote and Carson 1995). Yellowjacket wasps pose a serious threat to all Hawaiian picture wing flies including *D. attigua* (Kaneshiro and Kaneshiro 1995).

The number of native parasitic Hymenoptera (wasps) in Hawaii is limited, and only species in the family Eucoiliidae, are recorded to use Hawaiian picture wing flies as hosts (Kaneshiro and Kaneshiro 1995). Several species of non-native braconid wasps, *Diaschasmimorpha*

*tryo*ni, *D. longicaudatus*, *Opius vandenboschi*, and *Biosteres arisanus*, were purposefully introduced into Hawaii to control several species of pest tephritid fruit flies (Funasaki *et al*. 1988). However, none of these parasitic wasps are specific to the pest flies, but are known to attack other species of flies, including native flies in the family Tephritidae. While these wasps have not been recorded parasitizing Hawaiian picture wing flies, and may not successfully develop in Drosophilidae, females will sting any fly larva available in their attempts to oviposit (lay eggs) and can cause significant mortality (T. Duan, University of Hawaii, pers. comm., 1995). Large augmentive releases of these wasps or introductions of new species for biological control pose potential threats to all Hawaiian picture wing flies including *D. attigua*.

Based on the findings discussed above, non-native predatory and parasitic insects are considered significant factors contributing to the reduction in range and abundance of the Hawaiian picture wing flies, and in combination with habitat loss and fragmentation, are a serious threat to their continued existence. Some of these non-native species were intentionally introduced by the State of Hawaii's Department of Agriculture or other agricultural agencies (Funasaki *et al*. 1988) and importations and augmentations of lepidopteran parasitoids continue. Although the State of Hawaii requires new introductions be reviewed before release (Hawaii State Department of Agriculture 1994), post-release biology and host range cannot be predicted from laboratory studies (Gonzalez and Gilstrap 1992; Roderick 1992) and the purposeful release or augmentation of any fly predator or parasitoid is a potential threat to the conservation of Hawaiian picture wing flies including *D. attigua* (Gagné and Howarth 1985; Simberloff 1992).

The Hawaii Department of Health has been developing a strategy for preventing the red imported fire ant's establishment and also a contingency plan for addressing the potential scenario in the event of an unfortunate establishment.

D. <u>The inadequacy of existing regulatory mechanisms</u>.
Nonnative parasitic wasps pose a threat to the Hawaiian picture-wings, and some nonnative species are purposefully introduced by Federal and State agencies for biological control of pests flies. Federal regulations for controlling the introduction of bio-control agents are inadequate (Lockwood 1993). The U.S. Environmental Protection Agency (EPA), under the authority of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), regulates biological control agents as pesticides. However, EPA only regulates microorganisms (bacteria, fungi, protozoa, and viruses). EPA has exempted all other organisms from requirements of FIFRA because it has determined that they are adequately regulated by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS).

Although the State of Hawaii requires that new introductions be reviewed by special committees before release (HRS Chapt. 150A), post-release biology and host range cannot be predicted from laboratory studies (Gonzalez and Gilstrap 1992; Roderick 1992) and the purposeful release or augmentation of any dipteran predator or parasitoid is a potential threat to Hawaiian picture-wings.

The Forest Reserve Act of 1903 was an important action that protected watersheds in Hawaii. This act has been strengthened and re-titled Hawaii Department of Land and Natural Resources (DLNR) Title 13, Chapter 104 Rules Regulating Activities Within Forest Reserves and provides protection to native forest values from certain degrading factors caused by human activities. The Hawaii DLNR Regulation (Administrative Rule No. 1, Chapter 3) established the 4,022 ha (9,939 ac) Alakai Wilderness Preserve in 1964, recognizing the pristine forest values of that area and the need to control potential degrading factors.

Pig hunting is allowed on all islands either year-round or during certain months, depending on the area (Hawaii Department of Lands and Natural Resources n.d.-a, n.d.-b, n.d.-c). Hunting is allowed within the Alakai Wilderness, but because of its remoteness and rugged topography, little public hunting is done in the areas where this species occurs. Pigs have been fenced out of the three bogs where *D. attigua* currently occurs; however, without continued monitoring and maintenance of those fences, pigs from surrounding areas can easily access fenced areas.

E. Other natural or manmade factors affecting its continued existence.
Even if the threats responsible for the decline of this species were controlled, its persistence is hampered by the small number (2) of extant populations and the small geographic range of the known populations. This circumstance makes the species more vulnerable to extinction due to a variety of natural processes. Small populations are particularly vulnerable to reduced reproductive vigor caused by inbreeding depression, and they may suffer a loss of genetic variability over time due to random genetic drift, resulting in decreased evolutionary potential and ability to cope with environmental change (Lande 1988; Center for Conservation Update 1994). Small populations are also demographically vulnerable to extinction caused by random fluctuations in population size and sex ratio and to catastrophes such as hurricanes (Lande 1988).

No conservation measures have been taken to date to address this threat.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED
There are no additional prelisting activities to report.

SUMMARY OF THREATS:
The greatest threats to *Drosophila attigua* are loss of habitat from feral ungulates and nonnative plants, predation by nonnative species, particularly the fire ant (*Solenopsis papuana)* and yellowjacket (*Paravespula pennsylvanica),* and vulnerability due to low populations (2) and its small geographic range. Other than ginger removal in Pihea, no other conservation efforts have been initiated.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority

High	**Imminent**	Monotypic genus	1
		Species	**2 ***
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

This species is highly threatened throughout its limited range by habitat loss and modification by ungulate browsing, trampling, and uprooting and through the uncontrolled spread of nonnative plants. Additionally, the species is highly threatened by predation and parasitism by nonnative insect species and vulnerability due to low populations (2) and geographic range. All of the threats occur range-wide and other than ginger removal there are no other efforts to control or eradicate nonnative species.

Imminence:

Threats to *Drosophila attigua* from nonnative ungulates, weeds, and insects, particularly the fire ant (*Solenopsis papuana)* and yellowjacket (*Paravespula pennsylvanica)* are imminent because they are on-going.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *Drosophila attigua* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING

We conducted literature searches for recent articles on this species and contacted relevant species experts, U.S. Geological Survey-Biological Resources Division, Hawaii Natural Area Reserves System Commission, Bishop Museum, University of Hawaii, and University of Vermont researchers regarding the current status of this species. Although, no additional information on

the species' status was added to this update, the existing data regarding the species' status was verified**.**

This level of monitoring is appropriate to update the status of the species, since there are no known entities studying this particular species. The taxonomic status of the species is verified with Hardy and Kaneshiro (1969). The Hawaii Biodiversity and Mapping Program lists this species as critically imperiled (Hawaii Biodiversity and Mapping Program Database 2004). This species is not listed in the International Union for Conservation of Nature and Natural Resources Red Data List database (International Union for Conservation of Nature and Natural Resources database 2001).

List of Experts Contacted:

Name	Date	Place of Employment
Neal Evenhuis	July 12, 2005	Bishop Museum
David Foote	July 12, 2005	U.S. Geological Survey, BRD
Betsy Gagne	July 12, 2005	Hawaii Natural Area Reserves System Commission
Kenneth Kaneshiro	July 12, 2005	University of Hawaii
Patrick O'Grady	July 13, 2005	University of Vermont
David Preston	July 12, 2005	Bishop Museum

List of Databases Searched:

Name	Date
Hawaii Ecosystems at Risk Project	2005
Hawaii Biodiversity and Mapping Program	2004
International Union for Conservation of Nature and Natural Resources	2004

COORDINATION WITH STATES:

In October 2004 we provided the Division of Forestry and Wildlife Administrator, Paul Conry, with copies of our most recent candidate assessment forms for his review and comment. In addition, copies of the candidate forms were sent to Betsy Gagne, Executive Secretary for the Hawaii Natural Area Reserves System Commission. Ms. Gagne reviewed the information for this species and provided no additional information or corrections (B. Gagne, pers. comm. 2005).

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: Acting _____ 11/10/05
Regional Director, Fish and Wildlife Service Date

_____

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: 8/1/05
Conducted by: Lorena Wada, Pacific Islands FWO

Comments:

PIFWO Review

Reviewed by: Gina Shultz _____ Date: 9/28/05
Assistant Field Supervisor, Endangered Species

Patrick Leonard _____ Date: 10/11/05
Field Supervisor